

# PROFINET Adapter NA-9187

## User Manual



Version 1.02

2012 CREVIS Co.,Ltd

DOCUMENT CHANGE SUMMARY				
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1.01	5 6 17	Add your experience Changed Certification Add to Cable	2012/1/13	JE Kang
1.02		Add Example GSDML setting  Changed 6.2. and Trouble shooting, LED	2012/2/13	JE Kang
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## CONTENTS

1.	Important Notes .....	5
1.1.	Safety Instruction .....	6
1.1.1.	Symbols .....	6
1.1.2.	Safety Notes .....	6
1.1.3.	Certification .....	6
2.	Specification .....	7
2.1.	The Interface .....	7
2.1.1.	NA-9187 .....	7
2.2.	Specification .....	8
2.2.1.	General Specification .....	8
2.2.2.	Interface Specification .....	9
2.3.	LED Indicator .....	10
2.3.1.	Module Status LED (MOD) .....	10
2.3.2.	Network Status LED (NET) .....	10
2.3.3.	Expansion Module Status LED (I/O) .....	11
2.3.4.	Field Power Status LED .....	11
2.3.5.	Port1, Port2 : Link and Activity .....	11
3.	Dimension .....	12
3.1.	NA-9187 .....	12
4.	Mechanical Set Up .....	13
4.1.	Total Expansion .....	13
4.2.	Plugging and Removal of the Components .....	13

4.3.	Internal FnBus/Field Power Contacts .....	14
5.	PROFINET Electrical Interface.....	15
5.1.	FnBus System.....	15
5.2.	PROFINET Electrical Interface .....	17
5.2.1.	NA-9187 .....	17
5.2.2.	PROFINET Parameterization by Rotary Switch .....	18
5.2.3.	I/O Process Image Map .....	20
5.3.	Example Configuration with SEIMENS PLC STEP7 .....	21
5.3.1.	Example GSDML Setting.....	21
5.3.2.	Example Assign the device name.....	23
5.3.3.	Example Editing Ethernet Nodes(in non-volatile memory) .....	25
5.3.4.	Parameters, IO cycle time and port option with STEP7 .....	28
6.	NA-9187 PROFINET .....	32
6.1.	NA-9187 Parameter .....	32
6.2.	NA-9187 PROFINET IO Characteristics.....	33
6.2.1.	Device identity.....	33
6.2.2.	Device Access Point.....	33
6.2.3.	Sub-slot of NA-9187 .....	34
7.	Trouble Shooting.....	35
7.1.	How to diagnose by LED indicator.....	35
APPENDIX A.....		37
A.1.	Product List.....	37
A.2.	Glossary.....	39

## 1. Important Notes

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will CREVIS be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, CREVIS cannot assume responsibility or liability for actual use based on the examples and diagrams.

### Warning!

- ✓ **If you don't follow the directions, it could cause a personal injury, damage to the equipment or explosion**
- Do not assemble the products and wire with power applied to the system. Else it may cause an electric arc, which can result into unexpected and potentially dangerous action by field devices. Arching is explosion risk in hazardous locations. Be sure that the area is non-hazardous or remove system power appropriately before assembling or wiring the modules.
- Do not touch any terminal blocks or IO modules when system is running. Else it may cause the unit to an electric shock or malfunction.
- Keep away from the strange metallic materials not related to the unit and wiring works should be controlled by the electric expert engineer. Else it may cause the unit to a fire, electric shock or malfunction.

### Caution!

- ✓ **If you disobey the instructions, there may be possibility of personal injury, damage to equipment or explosion. Please follow below Instructions.**
- Check the rated voltage and terminal array before wiring. Avoid the circumstances over 50°C of temperature. Avoid placing it directly in the sunlight.
- Avoid the place under circumstances over 85% of humidity.
- Do not place Modules near by the inflammable material. Else it may cause a fire.
- Do not permit any vibration approaching it directly.
- Go through module specification carefully, ensure inputs, output connections are made with the specifications. Use standard cables for wiring.
- Use Product under pollution degree 2 environment..

## 1.1. Safety Instruction

### 1.1.1. Symbols

<b>DANGER</b> 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death property damage or economic loss.
<b>IMPORTANT</b>	Identifies information that is critical for successful application and understanding of the Product.
<b>ATTENTION</b> 	Identifies information about practices or circumstances that can lead to personal injury, property damage, or economic loss. Attentions help you to identify a hazard, avoid a hazard, and recognize the consequences.

### 1.1.2. Safety Notes

<b>DANGER</b> 	The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, e.g. FnBUS Pin.
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### 1.1.3. Certification

c-UL-us UL Listed Industrial Control Equipment, certified for U.S. and Canada

See UL File E235505

CE Certificate

EN 61000-6-2; Industrial Immunity

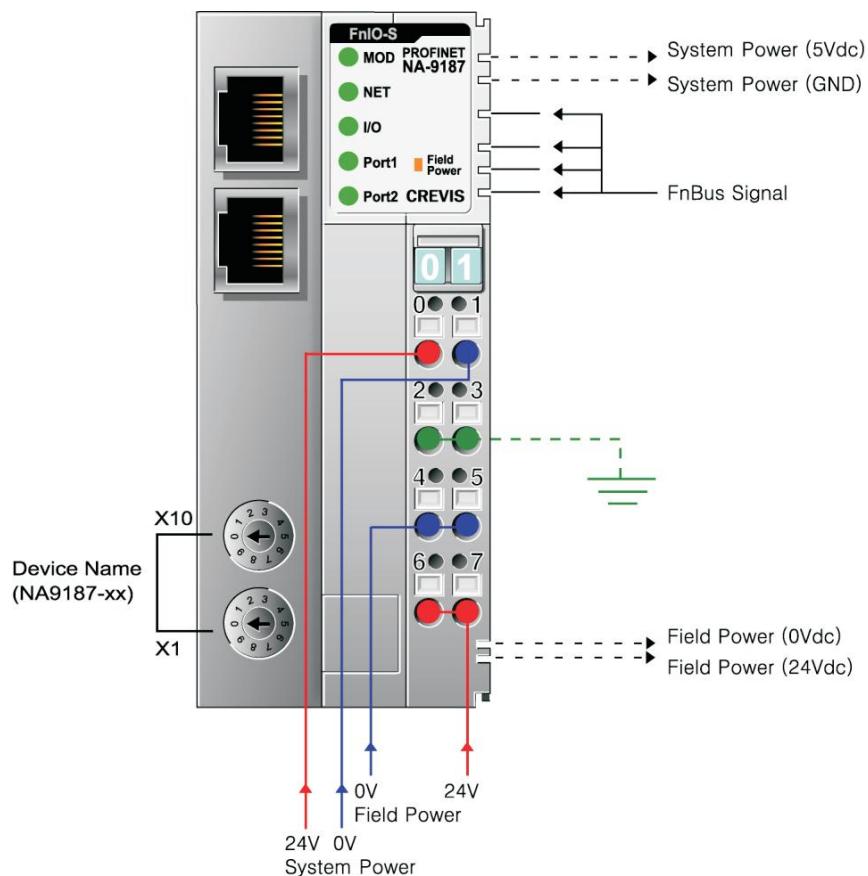
EN 61000-6-4; Industrial Emissions

FCC

## 2. Specification

### 2.1. The Interface

#### 2.1.1. NA-9187



## 2.2. Specification

### 2.2.1. General Specification

General Specification	
System Power	Supply voltage : 24Vdc nominal Supply voltage range : 11~28.8Vdc Protection : Output current limit (Min. 1.5A) Reverse polarity protection
Power Dissipation	115mA typical @24Vdc
Current for I/O Module	1.5A @5Vdc
Isolation	System power to internal logic : Non-isolation System power to I/O driver : Isolation
Field Power	Supply voltage : 24Vdc nominal Supply voltage range : 11~28.8Vdc
Current in Jumper Contacts	DC 10A Max.
Weight	150g
Module Size	45mm x 99mm x 70mm
Environment Condition	Refer to Environment Specification

Environmental Specifications	
Surrounding Temperature	0 to +50 °C
Operating Temperature	0 to +50 °C
Storage Temperature	-25 °C to 85 °C
Relative Humidity	90% non-condensing
Protection Class	IP 20
Mounting	DIN rail

## 2.2.2. Interface Specification

Interface Specification, NA-9187	
Protocol	PROFINET I/O RT, DCP, SNMP, LLDP
Station Type	PROFINET IO Device
Topology	Line or Star topology
Number of Nodes	Limited by the IP address
Number of Expansion I/O slots	Max. 32 slots
I/O Data Size	252 Bytes inputs/252 Bytes outputs
Indicators	1 green/red MOD Status Indicator 1 green/red NET Status Indicator 1 green/red I/O Status Indicator 1 green Port1 Link/Active Status Indicator 1 green Port2 Link/Active Status Indicator 1 green Field Power Status indicator
Baud rate	100Mbps Full-Duplex
Module Location	Starter module - Left side of FnIO System

### 2.3. LED Indicator

#### 2.3.1. Module Status LED (MOD)

State	LED is :	To indicate :
No Power	Off	No power is supplied to the unit.
OS Handle Error	Flashing Green 0.2s	OS handle unexpected exceptions.
Wrong IP address	Flashing Green 1s	IP address is 0.0.0.0
Device Operational	Green	The unit is operating in normal condition.
OS Fatal Error	Flashing Red 0.2s	OS Fatal error is occurred
Invalid RAM Image	Flashing Red 1s	Invalid RAM Image
User fatal error	Red	Invalid boot image header(Flash), ROM Boot loader

#### 2.3.2. Network Status LED (NET)

State	LED is :	To indicate :
Not Powered Not On-line	Off	Device is not on-line or may not be powered
On-line, Not connected	Flashing Green 0.2s	PROFINET IO connection has been established. Wait parameters.
Data Exchange Stop	Flashing Green 1s	PROFINET IO data exchange stop
On-line, Connected	Green	Device is on-line and allocated to a master
Invalid Configuration	Flashing Red 0.2s	Invalid Configuration
Minor Fault	Flashing Red 1s	PROFINET IO Connection is aborted after Data exchange
Fault	RED	PROFINET IO connection is aborted before a data exchange

### 2.3.3. Expansion Module Status LED (I/O)

State	LED is :	To indicate :
Not Powered No Expansion Module	Off	Device has no expansion module or may not be powered
Fn-Bus On-line, Do not Exchanging I/O	Flashing Green	Fn-Bus is on-line but does not exchanging I/O data - Passed the expansion module configuration.
Fn-Bus Connection, Run Exchanging IO	Green	Expansion Slot is connected and run exchanging I/O data
FnBus connection fault during exchanging IO	Red	One or more expansion module occurred in fault state. - Changed expansion module configuration. - FnBus communication failure. - Word data type error - Parameter setting error
Expansion Configuration Failed	Flashing Red	Failed to initialize expansion module - Detected invalid expansion module ID. - Overflowed Input / Output Size - Too many expansion module - Initial protocol failure - Mismatch vendor code between adapter and expansion module.

### 2.3.4. Field Power Status LED

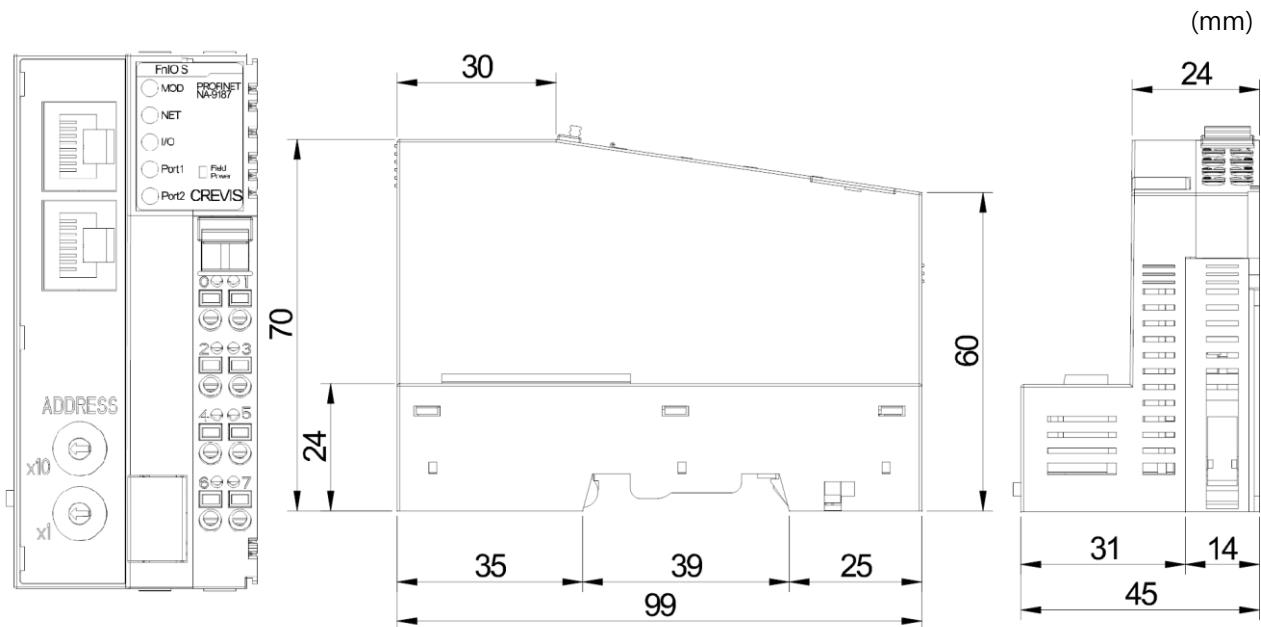
State	LED is :	To indicate :
Not Supplied Field Power	Off	Not supplied 24V dc field power
Supplied Field Power	Green	Supplied 24V dc field power

### 2.3.5. Port1, Port2 : Link and Activity

State	LED is :	To indicate :
Link Down	Off	Link is down
Active	Flashing Green	Active is present
Link UP	Green	Link is up (Physical connection is established)

### 3. Dimension

#### 3.1. NA-9187



## 4. Mechanical Set Up

### 4.1. Total Expansion

The number of the module assembly that can be connected is 32. So the maximum length is 426mm Exception. ST-2748 is excepted to calculate maximum length because that is double width module.

### 4.2. Plugging and Removal of the Components.

**DANGER**

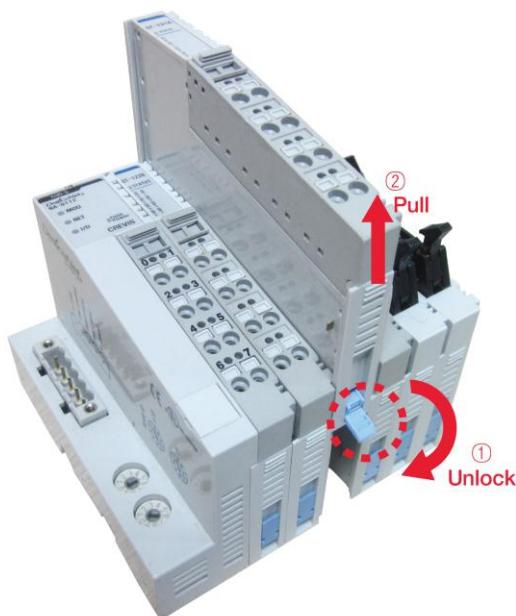


Before work is done on the components, the voltage supply must be turned off.



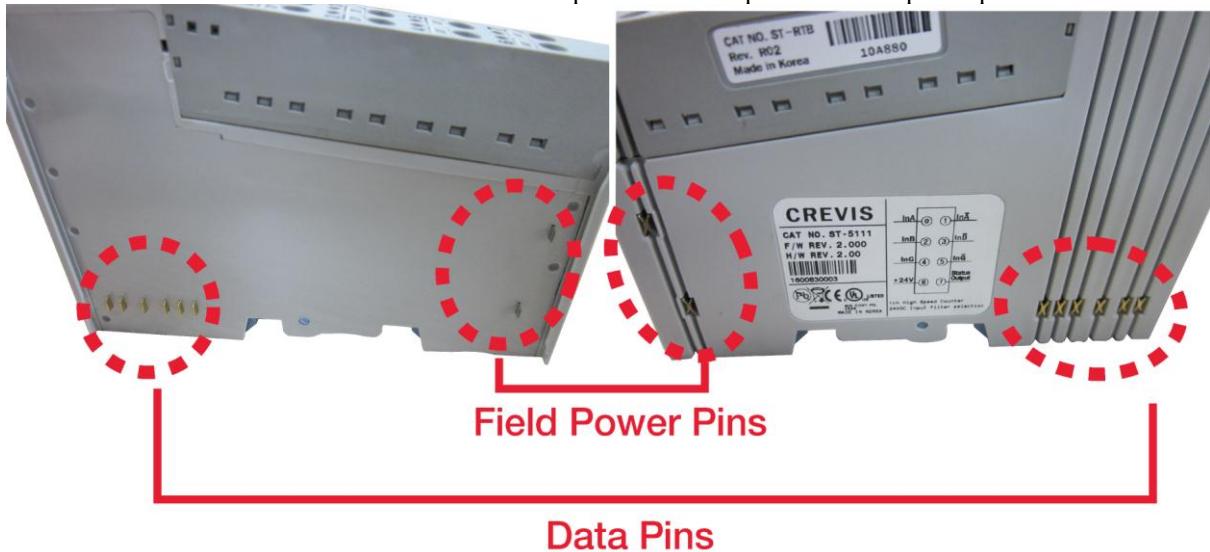
As above figure in order to safeguard the FnIO module from jamming, it should be fixed onto the DIN rail with locking level. To do so, fold on the upper of the locking lever.

To pull out the FnIO module, unfold the locking lever as below figure.



#### 4.3. Internal FnBus/Field Power Contacts

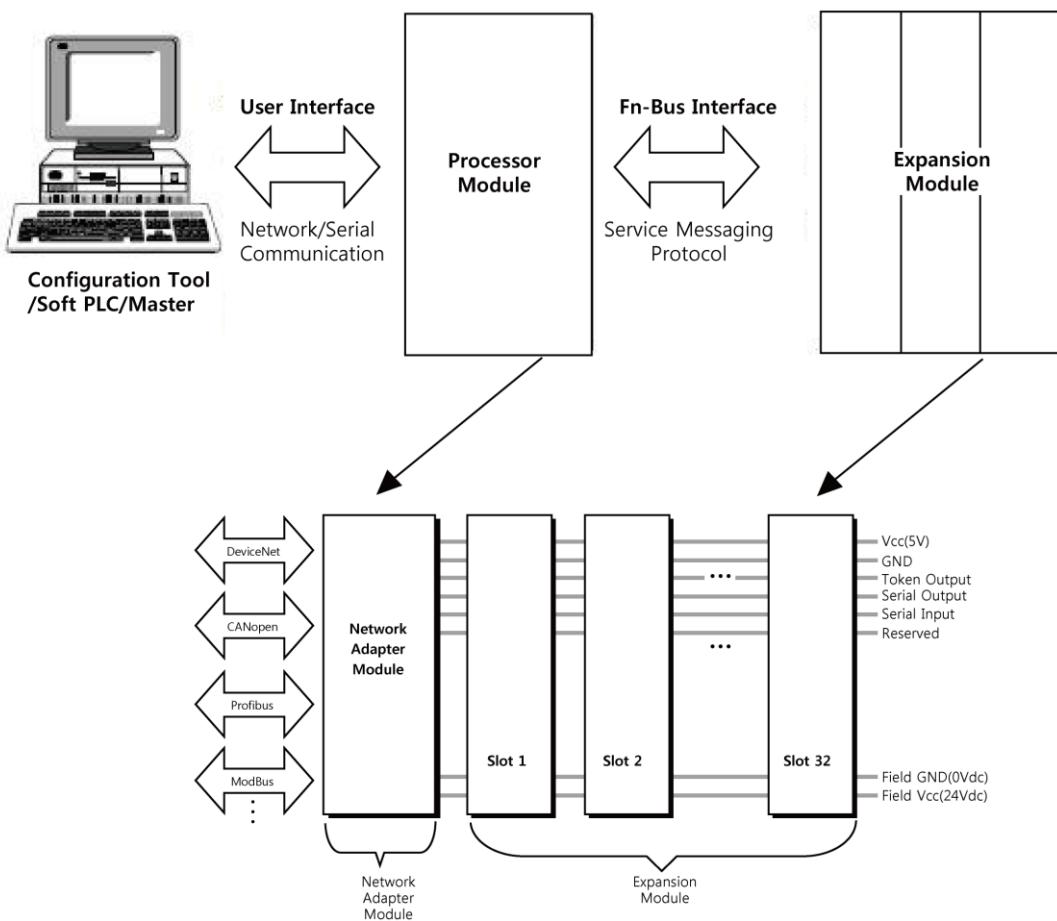
Communication between the NA series and the expansion module as well as system / field power supply of the bus modules is carried out via the internal bus. It is comprised of 6 data pin and 2 field power pin.


**DANGER**


Do not touch data and field power pins in order to avoid soiling and damage by ESD noise.

## 5. PROFINET Electrical Interface

### 5.1. FnBus System



- **Network Adapter Module**

The Network Adapter Module forms the link between the field bus and the field devices with the Expansion Modules.

The connection to different field bus systems can be established by each of the corresponding Network Adapter Module, e.g. for SyncNet, PROFIBUS, CANopen, DeviceNet, Ethernet/IP, CC-Link, MODBUS/Serial, MODBUS/TCP etc.

- **Expansion Module**

The Expansion Modules are supported a variety of input and output field devices. There are digital and analog input/output modules and special function modules.

- **Two types of FnBus Message**

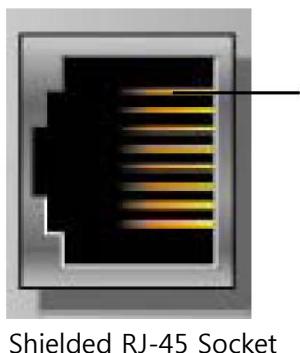
- Service Messaging
- I/O Messaging

**FnBus Pin Description**

No.	Name	Description
1	Vcc	System supply voltage (5V dc).
2	GND	System Ground.
3	Token Output	Token output port of Processor module.
4	Serial Output	Transmitter output port of Processor module.
5	Serial Input	Receiver input port of Processor module.
6	Reserved	Reserved for bypass Token.
7	Field GND	Field Ground.
8	Field Vcc	Field supply voltage (24Vdc).

## 5.2. PROFINET Electrical Interface

### 5.2.1. NA-9187



Shielded RJ-45 Socket

RJ-45	Signal Name	Description
1	TD+	Transmit +
2	TD-	Transmit -
3	RD+	Receive +
4	-	
5	-	
6	RD-	Receive -
7	-	
8	-	
Case	Shield	

#### ✓ Cable : EtherNet Cable

Up to 100m from Ethernet Hub



FnIO

Hub

FnIO

#### \* Caution

- Industrial HUB for EIP recommended
- Cable, the noise cable recommended

#### ATTENTION



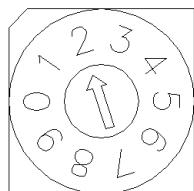
The use of an incorrect supply voltage or frequency can cause severe damage to the component.

### 5.2.2. PROFINET Parameterization by Rotary Switch

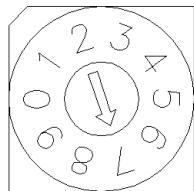
Value	Description	Factory settings
0	<ul style="list-style-type: none"> <li>- Name of station will be read from flash memory.</li> <li>(For example,NA9187-1)</li> <li>- IP address will be read from flash memory.</li> </ul>	<ul style="list-style-type: none"> <li>- Name of station : NA9187-00</li> <li>- IP address :192.168.0.<b>254</b></li> <li>- Subnet mask : 255.255.255.0</li> <li>- Gateway : 192.168.0.1</li> </ul>
1~99	<ul style="list-style-type: none"> <li>- Name of station will be NA9187-xx.</li> <li>(xx is the value of Rotary Switch)</li> <li>- IP address will be read from flash memory.</li> </ul>	

**When the rotary switch is not set to non-zero (1~99):**

If the decimal value of the rotary switch is not zero (0), the name of device will be fixed as “NA9187-xx” (xx: 1~99). You must put the fixed device name.



X 10 (MSD)



X 1 (LSD)

**When the rotary switch is set to zero (0):**

If the decimal value of the rotary switch set to zero (0), the device name will be read from nonvolatile memory. You should put the same name as the name from non-volatile memory. If you want to read the name in non-volatile memory, please refer to Chapter 3.Editing Ethernet nodes.

NA-1987 Devices on a PROFINET subnet must have unique names. The device names must satisfy DNS naming conventions. This means that the following rules must be observed:

- Names are limited to a total of 127 characters (letters, numbers, dashes or dots)
- Any component part (that is, a character string between two dots) of the device name may only be up to 63 characters long.
- Names cannot contain any special characters such as umlauts, parentheses, underscores, forward or backward slashes, empty spaces, etc. The dash is the only special character allowed.
- Names must not begin or end with the "-" or "." characters.
- Names must not have the format n.n.n.n (where n = 0...999).
- The device name must not start with numbers.
- Names must not begin with the character sequence "port-xyz-" (where x, y, z = 0...9).
- If you want to change the IP address in non-volatile memory, please refer to Chapter3. (Editing Ethernet Nodes)

Device names are assigned to PROFINET IO device when the device is being set up and placed in operation for the first time ("commissioned").

**The default name is "NA9187-SW"** (see "Short Designation").

If several devices of the same type are arranged on the same PROFINET IO system, then STEP7 automatically adds sequential number to the name from the GSD file. In this case, the second device has the extension "-1", the third one has the extension "-2", etc.

#### ◆ Communication Speed Setting

- See Master Module Setting about communication speed setting.

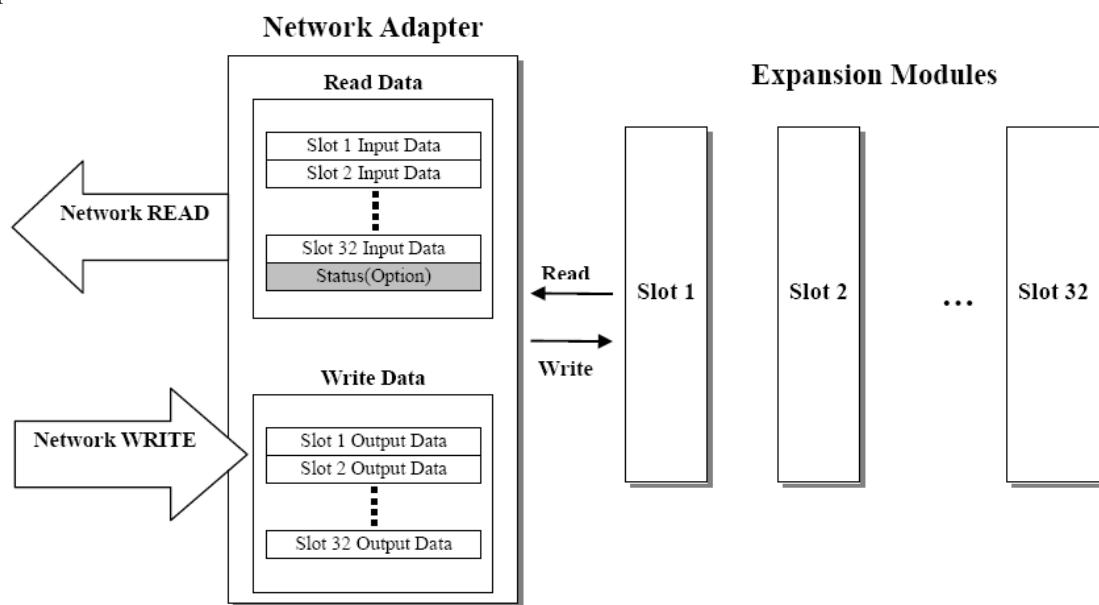
#### ATTENTION



MAC ID addresses have to be unique throughout the entire interconnected networks.

### 5.2.3. I/O Process Image Map

An expansion module may have 3 types of data as I/O data, configuration parameter and memory register. The data exchange between network adapter and expansion modules is done via an I/O process image data by FnBus protocol. The following figure shows the data flow of process image between network adapter and expansion modules.



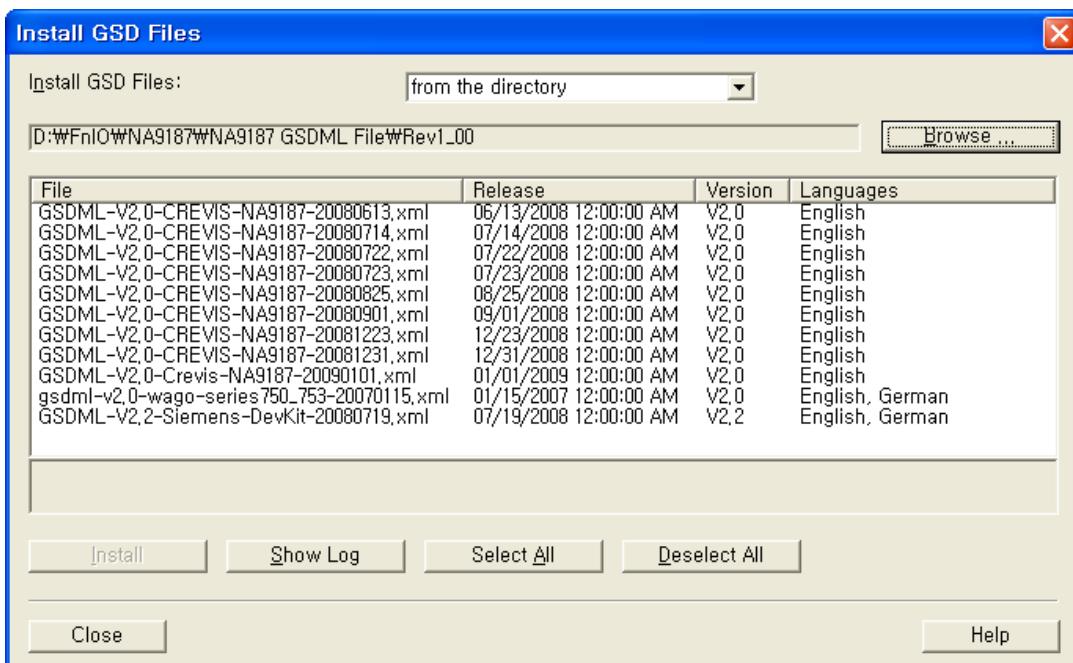
## 5.3. Example Configuration with SIEMENS PLC STEP7

### 5.3.1. Example GSDML Setting

Copy GSDML files GSDML-V2.0-Crevis-NA9187-yyyymmdd.xml and bitmap file and GSDML\_002A\_NA\_NA9187.bmp to your hard drive in the same directory. (yyyymmdd: year, month, day)

Start STEP 7 HW Configuration and install the GSDML file. (**Options->Install GSD File...**)  
Select option for “install GSD files” as “from the directory”.

Caution: The bit map file must be in the same folder as the GSDML file.



- “Browse” button

Click the "Browse" button to navigate to the GSDML file.

The field below the button displays the GSDML files in this folder with file name, release number, version as well as the languages available the GSDML file.

- “Install” button

Click the "Install" button to start to install the NA9187 GSDML file.

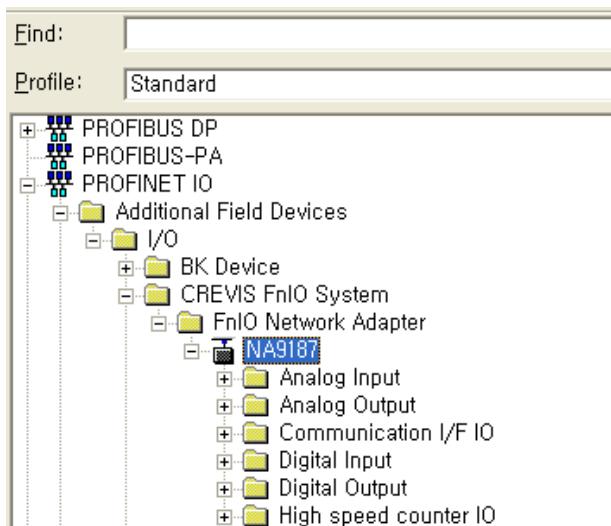
- “Show Log” button

Click the "View Log" button to display a log of the previous installation procedure.

During the installation, STEP 7 creates a log file in which all the files selected for installation are listed along with their statuses. If one or more GSDML files were already available or errors occurred during the installation, this information is listed in the log file.

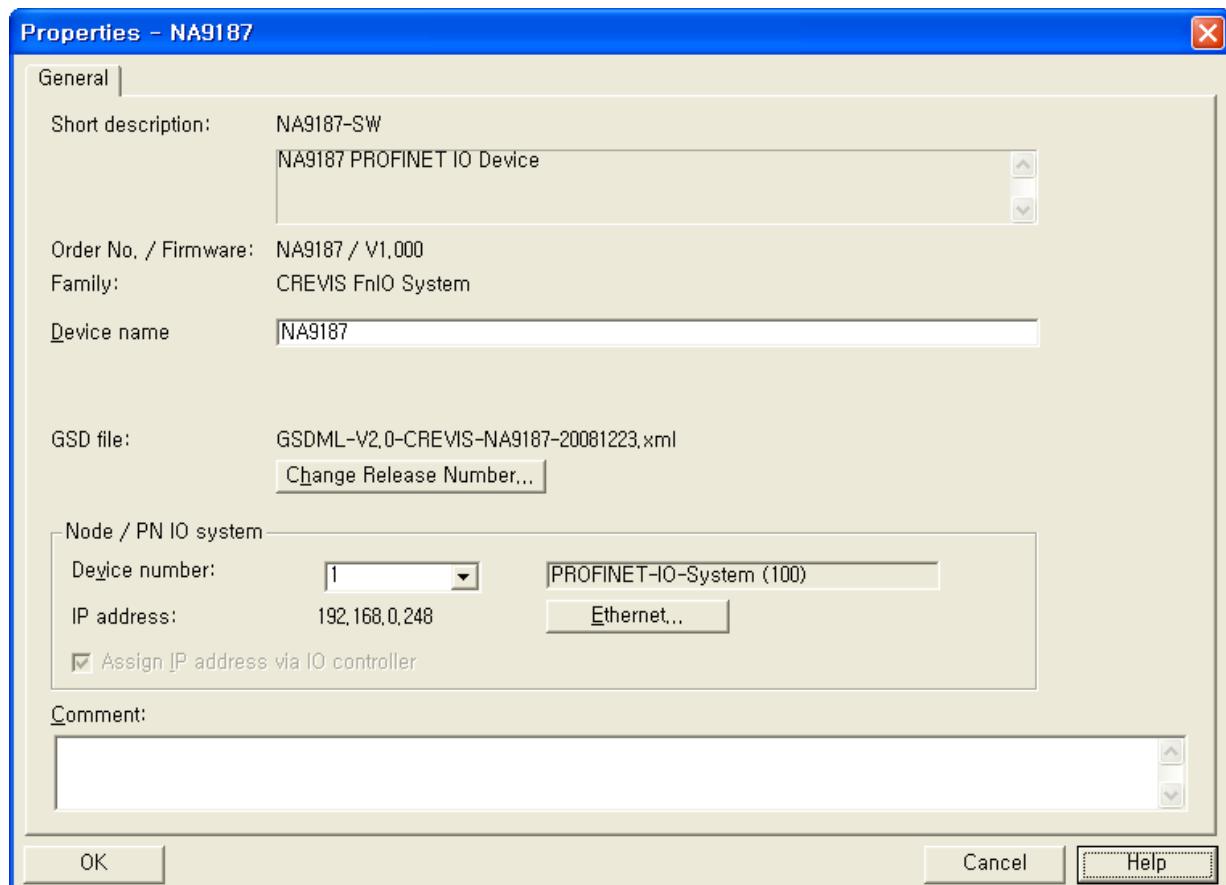
- After installation of GSDML file

You can then find the NA9187 device in the standard catalog as below picture.



### 5.3.2. Example Assign the device name

Insert a NA9187 node in your HW configuration and add the expansion IO modules according to your real configuration. If you double-click the node in HW configuration, a Properties dialog is appeared. You can set the name of the NA9187 and IP address.



#### ● Short description

The DNS compatible name “NA9187-SW” from GSDML file will be displayed.

Here you will find a short description about the NA-9187 device, to the extent that this is available in the GSDML file. (“NA9187 PROFINET IO Device”).

#### ● Order no/Firmware

The order no and Firmware version from GSDML file will be displayed. (This firmware version could be differ from the version of real NA-9187 device)

### ● Device Name

#### When the rotary switch is not set to non-zero (1~99):

If the decimal value of the rotary switch is not zero (0), the name of device will be fixed as "NA9187-xx" (xx: 1~99). You must put the fixed device name. (Refer to page 18)

### ● GSD File

The name of the GSDML file that is being used by STEP 7 to represent IO device and show its properties. If several NA-9187 GSDML files with different versions or releases are available in the STEP 7 data management, then the file with the latest GSDML schema version/release number is used to represent this device in the Hardware Catalog.

Click the "Change release number" button to display a dialog box in which you can access other versions and releases of GSDML files. This allows you to conveniently configure earlier NA-9187 devices or new NA-9187 devices.

### ● Nodes on a PROFINET IO system

Device number: the number of the NA-9187 device. You can use SFCs to evaluate the device number in the user program. In addition to the device number, the associated IO system also shown.

**IP address:** The IP address for the NA-9187 is normally automatically assigned by STEP 7. This address is based on the IP address of the IO controller. This automatically configured IP address is downloaded along with the hardware configuration to the IO controller. The IO controller assigns the IP address to the NA-9187 at startup.

- If the "Assign IP address via IO Controller" check box is selected, then the NA-9187 device receives its IP address at startup of the IO controller, as described above. To change this IP address, click the "Ethernet" button.
- If the "Assign IP address via IO Controller" check box is not selected, then NA-9187 device has to get its IP address from its non-volatile memory than the IO controller.
- If you want to change the IP address in non-volatile memory, please refer to Chapter3. (Editing Ethernet Nodes)

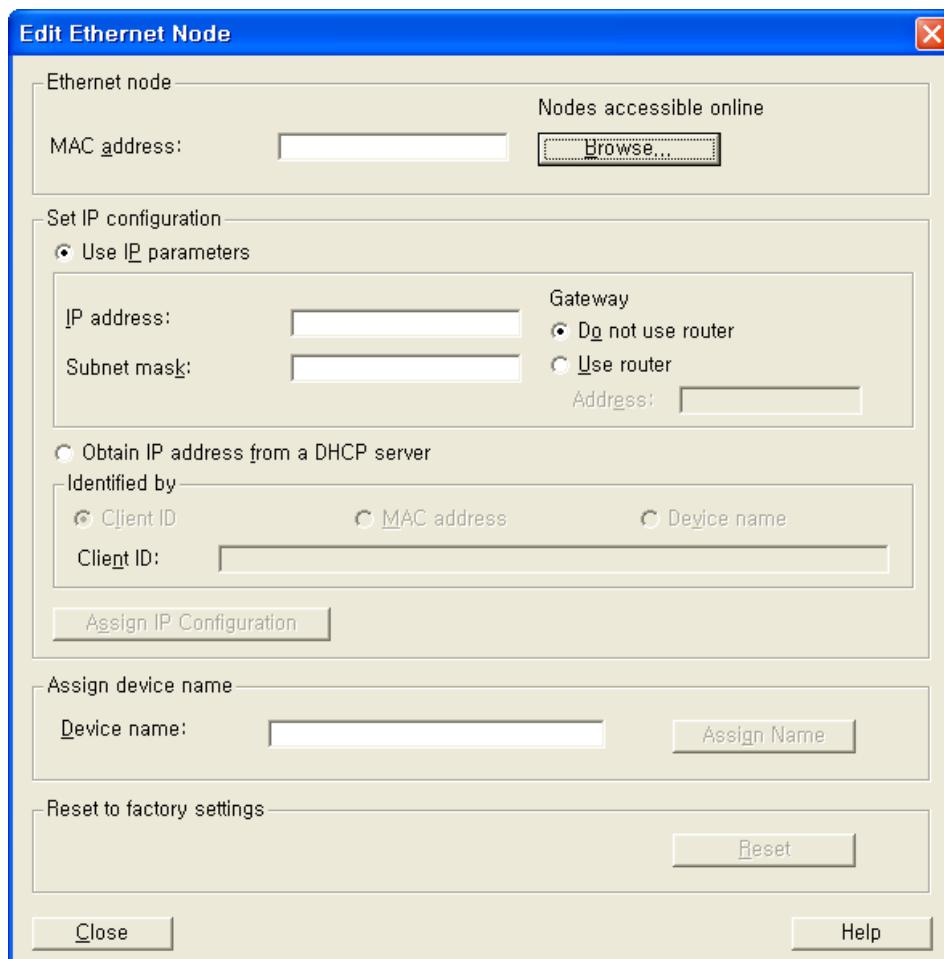
### 5.3.3. Example Editing Ethernet Nodes(in non-volatile memory)

You can change the device name and IP address in non-volatile memory.

To do this, select the "PLC → Ethernet → Edit Ethernet node..." menu command, which starts the dialog below.

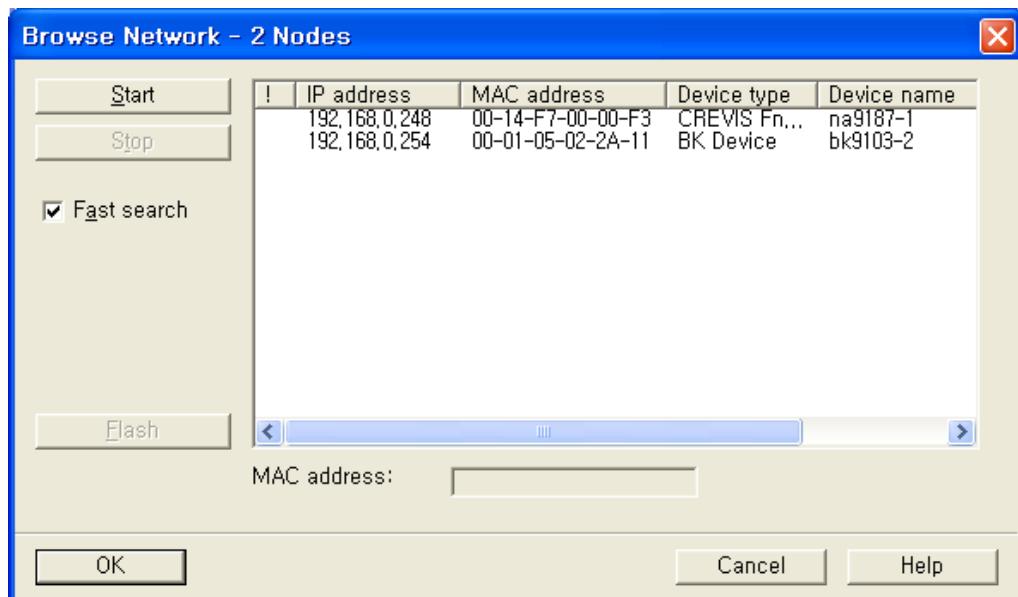
**Please check below condition:**

- You must set PG/PC interface to Ethernet card on your PC.
- The NA-9187 devices must be in the same Ethernet subnet as the PG.



### ● IP configuration

STEP 1) Find out the MAC addresses of the available devices using the "Browse" button or enter the MAC address (assuming you know it).



STEP 2) If this is the case; select the module with the known MAC address from the list displayed in the dialog after browsing the network.

STEP 3) Set the IP configuration; select from the following alternatives:

- Use IP parameters:

If you opened the dialog based on a selected module, the IP address already has the values configured for the module.  
Otherwise, you must enter the IP address, subnet mask and if applicable the gateway.

- Obtain IP address from a DHCP server

If you select this option, the IP address is obtained from a DHCP server.  
Depending on the selected option, the DHCP server is informed of the MAC address of the CP, the device name, or the client ID that you can enter here.  
The client ID is a string with a maximum of 63 characters. Only the following characters can be used: a-z, A-Z, 0-9 and - (dash)  
If you specify here that the DHCP server should obtain the IP address using a device name, you must first assign the device a device name.

STEP 4) Click the "Assign IP Configuration" button.

### ● Assigning Device Names

If you configure a NA-1987 as a PROFINET IO device, you can assign the PROFINET IO device name here. The device name must be specified according to DNS conventions; in other words:

- Restricted to a total of 240 characters (letters, digits, dash or period)
- Restrictions regarding parts of the name within the device name; in other words, a string between two periods must not exceed a maximum of 63 characters.
- No special characters such as umlauts (?? etc.), brackets, underscore, slash, blank etc. The dash is the only permitted special character.
- The device name must not begin or end with the "-" character.
- The device name must not have the structure n.n.n.n (n = 0.....999).
- The device name must not begin with the string "port-xyz-" (x, y, z = 0.....9).

*The device name must be unique in the Ethernet subnet (PROFINET IO system).*

Click the "Assign Name" button to transfer the device name to the device.

### ● Reset to Factory settings

With the "Reset" button, you can reset the NA-9187 to the factory settings. The IP address is then deleted.

- IP address in non-volatile memory will be 0.0.0.0.
- Device name in non-volatile memory will be NULL("") .

### 5.3.4. Parameters, IO cycle time and port option with STEP7

In HW configuration, there are several slots for a node.

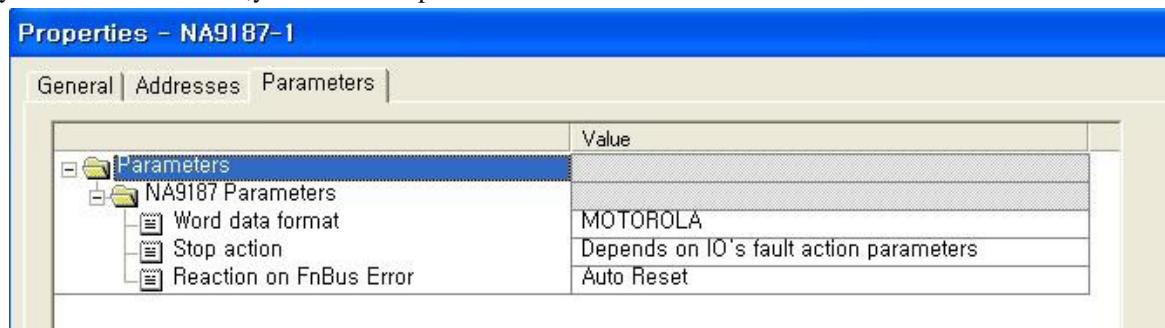
Slot	Module	Order Number
0	NA9187-1	NA9187
X1	NA9187	
X1 P1	Port 1	
X1 P2	Port 2	
1	ST-2318	ST-2318
2	ST-2318	ST-2318
3		
4		

If you double click the specific sub-slot, you can set the parameters of each NA-9187 sub-slot.

- Slot 0 => You can set the parameters of NA-9187
- Slot 0 X1 => You can set IO Cycle time
- Slot 0 X1 P1 => You can set the settings for port-001
- Slot 0 X1 P2 => You can set the settings for port-002

#### ● Parameters for NA-9187 itself

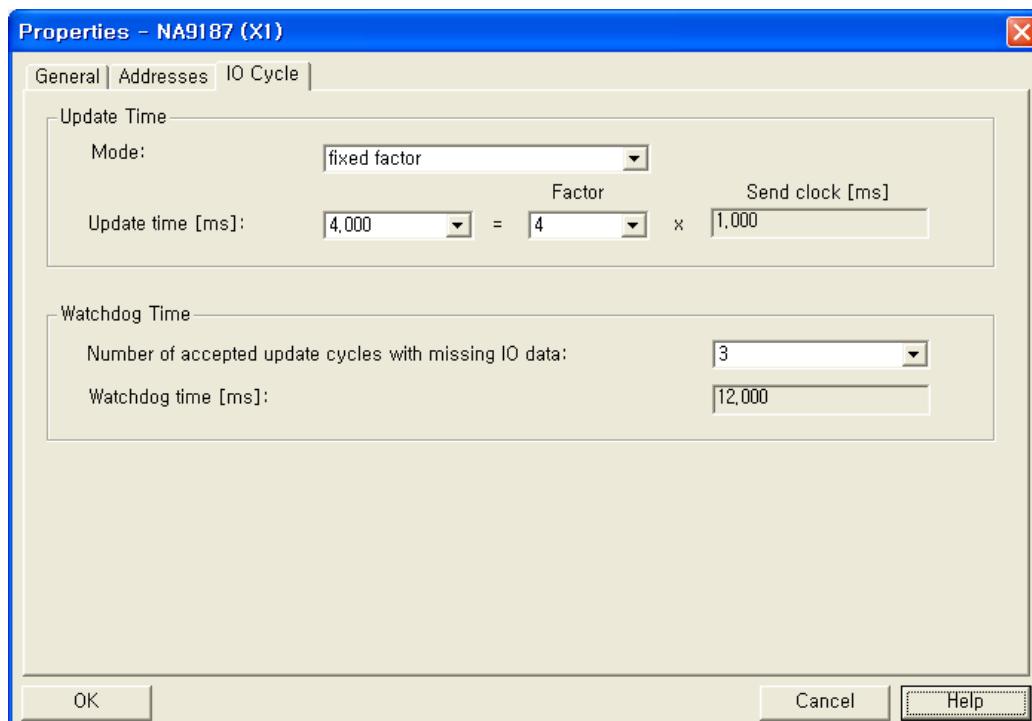
If you double click Slot 0, you can set the parameters of NA-9187.



### ● IO Cycle

If you double click Slot 0 X1, you can see the IO Cycle Tab. The following can be set:

- "automatic": STEP 7 finds the best solution for the user. The update time is kept as short as possible and as high as necessary, so that no errors or warnings can occur.
- "fixed factor": You can set the reduction ratio with which the NA-9187 is updated (for example, factor 4 for update every fourth send clock pulse).



**Update time [ms]** : The update time can only be changed when there are no synchronized PROFINET IO devices in the IO system.

**Factor** : Reduction ratio.

**Send clock [ms]** : Send clock set in the sync domain.

**Number of accepted update cycles with missing IO data :**

To make adaptations in problem situations, you can change the default number of accepted update cycles with missing IO data (for example during commissioning).

This action will also indirectly change the watchdog time.

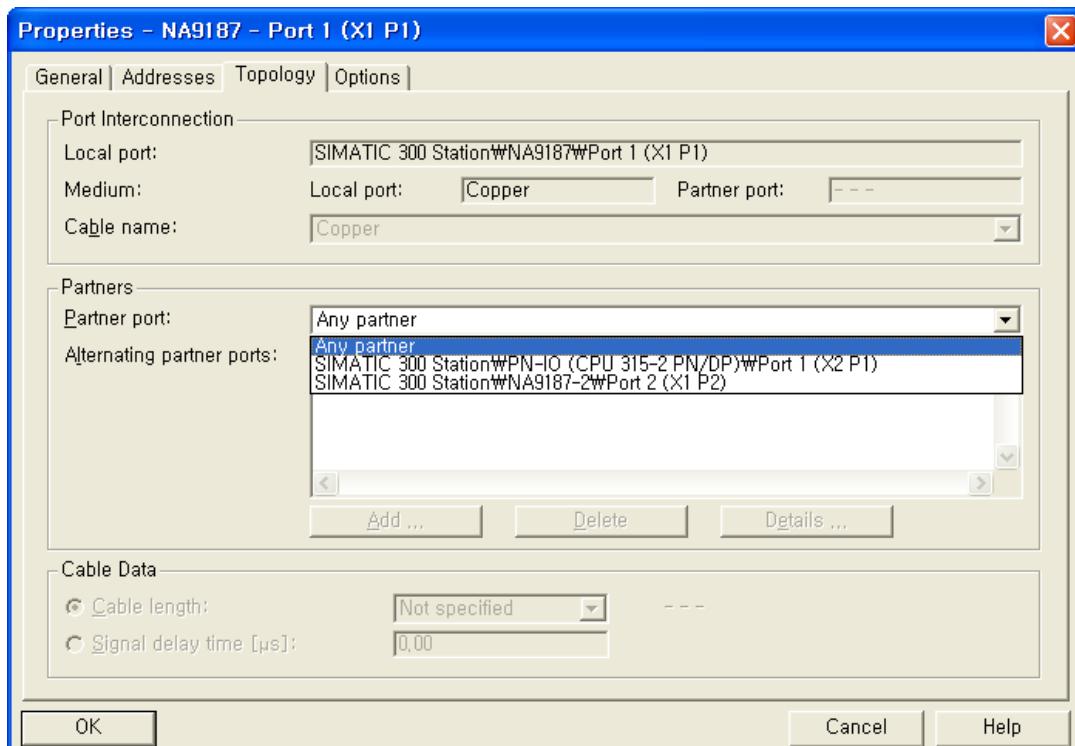
In much the same way as in a PROFIBUS system, exceeding the watchdog time will result in an error reaction (the IO device switches its outputs to a safe state).

**Watchdog Time** : The watchdog time is computed as follows:

Product of "Update Time" x "Number of accepted update cycles with missing IO data".

### ● Port 1 or Port 2 : Topology Tab

If you double click Slot 0 X1 P1 or Slot 0 X1 P2, you can see the properties for port 1 or port 2.



#### Port Interconnection(read only)

You can see the name of the local port.

Copper cable will be displayed as a medium for the local and partner port.

#### Partners

The NA-9187 devices can support topology configuration.

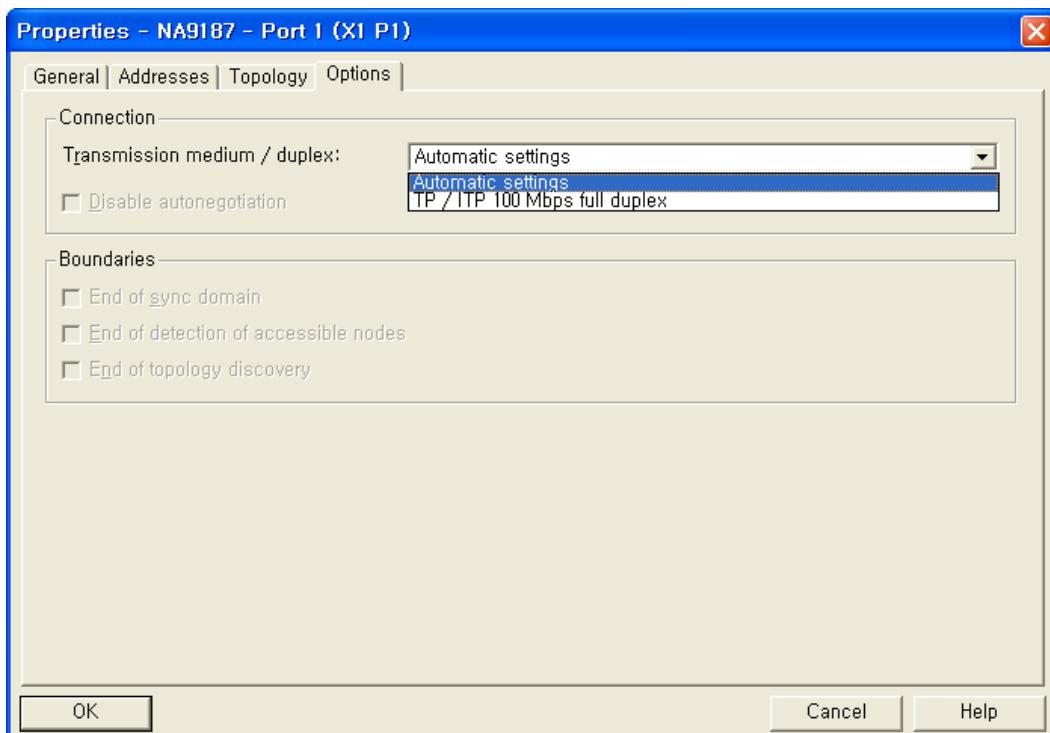
You can interconnect NA-9187 devices under "Partner port" when one of below conditions are meet.

- The port is connected to the PROFINET subnet.
- Other PROFINET devices are connected to a port on the subnet.
- The devices support topology configuration(NA-9187 supports this functionality)

Select the required partner port from the "Partner port" drop-down list.

The default setting is "Any partner".(We recommended the default setting in normal case.)

### ● Port 1 or Port 2 : Options Tab



#### Transmission medium / duplex

If necessary, you can enter fixed port settings here. By default, "Automatic setting" is already selected.

Usually, this setting will provide smooth, problem-free communication.

Caution: Ensure that the setting for the local port and the partner port are identical.

- ✓ Automatic settings :
 

Recommended default setting for the port. The transmission settings are automatically "negotiated" with the partner port. "Auto negotiation" is also automatically enabled with this setting.
- ✓ TP / ITP 100Mbps full duplex :
 

The effect depends on the setting "Disable auto-negotiation".

#### Disable “auto negotiation” check box

This check box can only be controlled when you have selected a concrete medium( TP/ITP with 100 Mbps full duplex). The check box has no effect with the automatic setting.

When the check box is selected, the defined setting of the port is forced, such as required for a quick start of the NA-9187. You need to ensure that the partner port has the same settings.

## 6. NA-9187 PROFINET

### 6.1. NA-9187 Parameter

Parameter	Setting	Description
Word data type	MOTOLORA *	Big Endian format(MSB-LSB)
	INTEL	Little Endian format(LSB-MSB)
Stop action	Clear output image to 0 *	All outputs are set to 0.
	Hold last valid output image	All outputs are remain the last value.
	Depends on IO's fault action parameters	Stop the FnBus communication.
Reaction on FnBus error	Clear input image	The input image is clear to 0.
	Hold last image	The input image remain the last valid value.
	Auto reset *	NA9187 performs reset.
	Disconnect PROFINET	Stop the communication with Controller.

\* Default settings

## 6.2. NA-9187 PROFINET IO Characteristics

### 6.2.1. Device identity

Item	Value
Vendor	CREVIS
Vendor ID	0x0140
Product family	CREVIS FnIO System
Device ID	0x9187
Details	NA9187 PROFINET IO Device

### 6.2.2. Device Access Point

Item	Value
Module Ident Number	0x00009187
Details	NA9187 PROFINET IO Device
Vendor Name	CREVIS
Order Number	NA9187
Category	FnIO Network Adapter
Software Version	V20.000
Hardware Version	V20.000
Maximal Input Length	252 Bytes
Maximal Output Length	252 Bytes
Physical Slots	0..32
Minimal Device Interval	4 ms
Based on	NS9360
DNS Compliant Name	NA9187-xx
Supports Extended Assignment of IP Address	No
Fixed in Slots	0
Instance Field of the Object UUID	1
Supports Multiple Write	No
Requires IOPS/IOCS	Yes
Requires Engineering tool which supports at least GSDML Version	V2.0

### 6.2.3. Sub-slot of NA-9187

Item	Value
Sub-slot Number	Sub-slot Label
32768 (0x8000)	X1
32769 (0x8001)	X1 P1
32770 (0x8002)	X1 P2

Sub-module								
Byte Offset	Data							
0	0x00, 0x00							
Name of Parameter	Data Type	Byte Offset	Bit Offset	Bit Length	Default value	Value Range	Changeable	Visible
Word data format	Bit Area	0	0	1	MOTOROLA	0..1	Yes	Yes
Stop action	Bit Area	1	0	2	Clear output images to 0	0..2	Yes	Yes
Reaction on FnBus Error	Bit Area	1	2	2	Auto Reset	0..3	Yes	Yes
Interface : NA-9187								
Sub-module Ident Number	0x0001							
Sub-slot Number	32768 (0x8000)							
Supports Real time Class	Class 1							
Supports Isochronous Mode	No							
AR Block Version	1							
IOCR Block Version	1							
Alarm CR Block Version	1							
Sub-module Data Block Version	1							
Number of Additional Input CRs	0							
Number of Additional Output CRs	0							
Number of Additional Multicast Provider CRs	0							
Number of Multicast Consumer CRs	0							
Supported Send-clock Factors (Base 31,25μs)	32 64 128							
Supported Reduction Ratios	1	2	4	8	16	32	64	128 256 512
Port 1 : Port 1								
Sub-module Ident Number	0x0003							
Sub-slot Number	32769 (0x8001)							
MAU Type	100BASET XFD							
Port 2 : Port 2								
Sub-module Ident Number	0x0004							
Sub-slot Number	32769 (0x8002)							
MAU Type	100BASET XFD							

## 7. Trouble Shooting

### 7.1. How to diagnose by LED indicator

LED Status	Cause	Action
All LED turns off	- No power	- Check main power Cable
	- System power is not supplied.	- Contact Sales team and send module for repair.
MOD LED flashes green	- Failure of initialization EEPROM parameter.	- Contact Sales team and send module for repair.
MOD LED flashes red	- Excess of IO size - Wrong IO composition - Occurrence of EEPROM checksum error	- Use expansion slot up to 32. - Compose that IO total size is not excess. - Check composition I/O Module
MOD LED is red	- Wrong address ID - Occurrence critical error in firmware	- Contact Sales team and send module for repair.
I/O LED turns off	- Failure of realization expansion Module - None expansion Module	- Check connector status both NA series and expansion module.
I/O LED flashes red	- Failure of configuration baud rate	- Check communication cable with Master - Check power for master.
	- <b>Excess of expansion slot</b> - Failure of initialization I/O	- Use expansion slot up to 32. - Compose that IO total size is not excess. NA series notice unidentified expansion module ID. Check status of expansion module.
I/O LED is red	- Failure of exchanging I/O data	Check status of expansion IO connection.
NET LED turns off	- Failure of communication with Master	Check main power for master and communication cable.
NET LED flashed green	- Failure of exchanging data with master	Check status in software for Master configuration.
NET LED is red	- Communication connecting lost	Check BUS line cable for connection with master.
		Check duplication address.

## 7.2. How to diagnose when device couldn't communicate network

### Inspection of wrong or omission cable connection.

- Check status of cable connection for each node.
- Check that all color matches between connector and cable.
- Check wire omission.

### Terminator resistor

- If terminator resistor is not installed, install terminator resistor
- Check location of terminator resistor

### Configuration of Node address

- Check duplication node address.

### Configuration of Master

- Check configuration of master
- Check whether to do download or don't
- Check composition is right

Configuration of communication baud rate  
I/O size  
Configuration of each node

### Ground and environment

- Check ground is contacted
- Check environment factor (temperature, humidity, etc) is in less than regular limit

## APPENDIX A

### A.1. Product List

No.	ST-Number	Description	ID(hex)	Production Status
<b>Digital Input Module</b>				
	ST-1114	4 Points, Sink(Positive), 5Vdc,	41 00 01	Active
	ST-111F	16 Points, Sink(Positive), 5Vdc,	41 01 19	Active
	ST-1124	4 Points, Source(Negative), 5Vdc,	41 00 02	Active
	ST-112F	16 Points, Source(Negative), 5Vdc,	41 01 1A	Active
	ST-1214	4 Points, Sink(Positive), 12V/24Vdc,	41 00 03	Active
	ST-1218	8 Points, Sink(Positive), 12V/24Vdc,	41 00 07	Active
	ST-121F	16 Points, Sink(Positive), 12V/24Vdc,	41 01 13	Active
	ST-1224	4 Points, Source(Negative), 12V/24Vdc,	41 00 04	Active
	ST-1228	8 Points, Source(Negative), 12V/24Vdc,	41 00 08	Active
	ST-122F	16 Points, Source(Negative), 12V/24Vdc,	41 01 14	Active
	ST-1314	4 Points, Sink(Positive), 48Vdc,	41 00 05	Active
	ST-131F	16 Points, Sink(Positive), 48Vdc,	41 01 17	Active
	ST-1324	4 Points, Source(Negative), 48Vdc,	41 00 06	Active
	ST-132F	16 Points, Source(Negative), 48Vdc,	41 01 18	Active
	ST-1804	4 Points, 110Vac,	41 00 09	Active
	ST-1904	4 Points, 220Vac,	41 00 0A	Active
<b>Digital Output Module</b>				
	ST-2114	4 Points TTL Inverting, 5Vdc/20mA,	81 00 0D	Active
	ST-2124	4 Points TTL Non-Inverting, 5Vdc/20mA,	81 00 0F	Active
	ST-221F	16 Points Sink(Negative Logic), 24Vdc/0.5A,	81 01 15	Active
	ST-222F	16 Points Source(Positive Logic), 24Vdc/0.5A,	81 01 16	Active
	ST-2314	4 Points Sink(Negative Logic), 24Vdc/0.5A,	81 00 0E	Active
	ST-2318	8 Points Sink(Negative Logic), 24Vdc/0.5A,	81 00 11	Active
	ST-2324	4 Points Source(Positive Logic), 24Vdc/0.5A,	81 00 10	Active
	ST-2328	8 Points Source(Positive Logic), 24Vdc/0.5A,	81 00 12	Active
	ST-2414	4 Points Sink(Negative Logic), 24Vdc/0.5A, Diagnostics	81 00 08	Active
	ST-2424	4 Points Source(Positive Logic), 24Vdc/0.5A, Diagnostics	C1 00 00 38	Active
	ST-2514	4 Points Sink(Negative Logic), 24Vdc/2A, Diagnostics	C1 00 00 35	Active
	ST-2524	4 Points Source(Positive Logic), 24Vdc/2A, Diagnostics	C1 00 00 36	Active
	ST-2614	4 Points Sink(Negative Logic), 24Vdc/2A,	81 00 3B	Active
	ST-2624	4 Points Source(Positive Logic), 24Vdc/2A,	81 00 3C	Active
	ST-2742	2 Points, 230Vac/2A, 24Vdc/2A, Relay	81 00 0B	Active
	ST-2744	4 Points, 230Vac/2A, 24Vdc/2A, Relay	81 00 51	Active
	ST-2748	8 Points, 230Vac/2A, 24Vdc/2A, Relay	81 00 50	Active

	ST-2792	2 Points, 230Vac/2A, 24Vdc/2A, Relay, Manual/Auto	C1 00 01 BE	Active
	ST-2852	2 Points, 12~125Vac/0.5A, Triac	81 00 0C	Active
	ST-2924	4 Points, 24Vac/2A, 24Vdc/2A, 4 Points/4COM	81 00 C0	NEW
	ST-2944	4 Points, 24Vac/2A, 24Vdc/2A, 1 Points/1COM	81 00 C1	NEW
	ST-2734	4 Points, 24~220Vac/dc/0.5A, 1 Points/1COM	81 00 C2	NEW

**Analog Input Module**

	ST-3114	4 Channels, Current, 0~20mA, 12bit	41 43 1C	Active
	ST-3118	8 Channels, Current, 0~20mA, 12bit	41 47 82	Active
	ST-3134	4 Channels, Current, 0~20mA, 14bit	41 43 1E	Active
	ST-3214	4 Channels, Current, 4~20mA, 12bit	41 43 1D	Active
	ST-3218	8 Channels, Current, 4~20mA, 12bit	41 47 83	Active
	ST-3234	4 Channels, Current, 4~20mA, 14bit	41 43 1F	Active
	ST-3274	4 Channels, Current, 4~20mA, 12bit, Sensor Connector	41 43 A3	Active
	ST-3424	4 Channels, Voltage, 0~10Vdc, 12bit	41 43 20	Active
	ST-3428	8 Channels, Voltage, 0~10Vdc, 12bit	41 47 22	Active
	ST-3444	4 Channels, Voltage, 0~10Vdc, 14bit	41 43 22	Active
	ST-3474	4 Channels, Voltage, 0~10Vdc, 12bit, Sensor Connector	41 43 A0	Active
	ST-3524	4 Channels, Voltage, -10Vdc~10Vdc, 12bit	41 43 21	Active
	ST-3544	4 Channels, Voltage, -10Vdc~10Vdc, 14bit	41 43 23	Active
	ST-3624	4 Channels, Voltage, 0~5Vdc, 12bit	41 43 24	Active
	ST-3644	4 Channels, Voltage, 0~5Vdc, 14bit	41 43 25	Active
	ST-3702	2 Channels, RTD, Status	41 41 28	Active
	ST-3704	4 Channels, RTD, Status	41 43 64	Active
	ST-3708	8 Channels, RTD, Status	41 47 65	Active
	ST-3802	2 Channels, TC	41 41 2A	Active
	ST-3804	4 Channels, TC	41 43 66	Active
	ST-3808	8 Channels, TC	41 47 67	Active

**Analog Output Module**

	ST-4112	2 Channels, Current, 0~20mA, 12bit	81 41 2C	Active
	ST-4114	4 Channels, Current, 0~20mA, 12bit	81 43 6D	Active
	ST-4212	2 Channels, Current, 4~20mA, 12bit	81 41 2D	Active
	ST-4214	4 Channels, Current, 4~20mA, 12bit	81 43 6E	Active
	ST-4274	4 Channels, Current, 4~20mA, 12bit, Sensor Connector	81 43 B3	Active
	ST-4422	2 Channels, Voltage, 0~10Vdc, 12bit	81 41 2E	Active
	ST-4424	4 Channels, Voltage, 0~10Vdc, 12bit	81 43 6A	Active
	ST-4474	4 Channels, Voltage, 0~10Vdc, 12bit, Sensor Connector	81 43 B0	Active
	ST-4491	1 Channel, Voltage, 0~10Vdc, 12bit, Manual Type	C1 40 41 BF	Active
	ST-4522	2 Channels, Voltage, -10~10Vdc, 12bit	81 41 2F	Active
	ST-4622	2 Channels, Voltage, 0~5Vdc, 12bit	81 41 30	Active
	ST-4911	1 Channel, Current, 0~1A, 12bit	81 40 31	Active

<b>Special Module</b>				
	ST-5101	1 Channel, High Speed Counter, 5V Input	C1 01 05 34	Active
	ST-5111	1 Channel, High Speed Counter, 24V Input	C1 01 05 39	Active
	ST-5112	2 Channel, High Speed Counter, 24V Sink Input	C1 01 07 4D	Active
	ST-5114	4 Channel, High Speed Counter, 24V Sink Input	C1 03 0F 4C	Active
	ST-5211	RS232 Communication, 1Channel, RTS/CTS Flow Control	C1 05 05 42	Active
	ST-5212	RS232 Communication, 2Channel	C1 0B 0B 43	Active
	ST-5221	RS422 Communication, 1Channel	C1 05 05 44	Active
	ST-5231	RS485 Communication, 1Channel	C1 05 05 45	Active
	ST-5232	RS485 Communication, 2Channel	C1 0B 0B 46	Active
	ST-5351	SSI Interface 1CH	C1 01 09 9E	Active
	ST-5422	2 CH PWM output, 1.5A/24Vdc, source	C1 05 01 57	Active
	ST-5442	2 CH PWM output, 0.5A/24Vdc, source	C1 05 01 56	Active
	ST-5444	4 CH PWM output, 0.5A/24Vdc, source	C1 0B 03 54	Active
	ST-5641	1 CH Pulse output, 0.5A/24Vdc, source	C1 05 03 92	Active
	ST-5642	2 CH Pulse output, 0.5A/24Vdc, source	C1 09 07 90	Active
	ST-5651	1 CH Pulse output, RS422	C1 05 03 98	Active
<b>Power Module</b>				
	ST-7408	8 Channels, Shield, ID Type	02 00 E4	Active
	ST-7508	8 Channels, Common, 0Vdc, ID Type	02 00 E5	Active
	ST-7511	1 Channel, Expansion Power, Input 24Vdc, Output 1.0A/5Vdc, ID Type	02 00 E0	Active
	ST-7518	8 Channels, Common, 24Vdc, ID Type	02 00 E6	Active
	ST-7588	8 Channels, Common, 0Vdc and 24Vdc, ID Type	02 00 E7	Active
	ST-7641	1 Channel, Field Distributor, 5Vdc~48Vdc, 110Vac~220Vac, ID Type	02 00 E2	Active

## A.2. Glossary

- System Power: The power for starting up CPU.
- Field Power: The power for input and output line.
- Terminator Resistor: Resistor for prevention reflected wave.
- EDS: Electronic Data Sheet.
- sinking: The method of input and output what device does not have power source.
- sourcing: The method of input and output what device have power source.